

WHAT IS CLAIMED IS:

1. An in-plane switching type liquid crystal display unit comprising

a pair of substrate structures having at least plural pixel electrodes and a common electrode on one of the substrate structures thereof, and

a liquid crystal layer sandwiched between said substrate structures and having a first elastic coefficient concerning a deformation like a spray pattern and fallen within the range expressed as

$$6 \text{ pico-newton} < \text{said first elastic coefficient} < 25 \text{ pico-newton.}$$

2. The in-plane switching type liquid crystal display unit as set forth in claim 1, in which the liquid crystal of said liquid crystal layer has a positive anisotropy of dielectric constant.

3. The in-plane switching type liquid crystal display unit as set forth in claim 1, in which said liquid crystal further has a second elastic coefficient concerning a deformation like a bend line and a third elastic coefficient concerning a twist deformation, and said first elastic coefficient, said second elastic coefficient and said third elastic coefficient satisfy an inequality expressed as

$$0.5 < (\sqrt{K_{11} \times K_{33}} / K_{22}) < 2.0$$

where K_{11} is said first elastic coefficient, K_{33} is said second elastic coefficient and K_{22} is said third elastic coefficient.

4. The in-plane switching type liquid crystal display unit as set forth in claim 1, in which said substrate structures are spaced from each other by a distance ranging from 1.0 micron to 6.0 microns.

5. The in-plane switching type liquid crystal display unit as set forth in claim 1, in which an electric field is created between each of said plural pixel electrodes and a part of said common electrode under application of a potential difference therebetween, and said each of said plural pixel electrodes is spaced from and said part of said common electrode in a direction parallel to inner surfaces of said substrate structures by a distance ranging from 2 microns to 15 microns.

6. The in-plane switching type liquid crystal display unit as set forth in claim 1, in which said substrate structures are spaced from each other by a first distance ranging from 1.0 micron to 6.0 microns, and each of said plural pixel electrodes and an associated part of said common electrode is spaced from each other in a direction parallel to inner surfaces of said substrate structures by a second distance ranging from 2 microns to 15 microns.

7. The in-plane switching type liquid crystal display unit as set forth in claim 1, in which said plural pixel electrodes, parts of said common electrode respectively associated with said plural pixel electrodes and pieces of said liquid crystal layer respectively overlapped with combinations of said plural pixel electrodes and said parts form in combination plural pixels arranged in a matrix.

8. The in-plane switching type liquid crystal display unit as set forth in claim 7, further comprising color filters selectively put in the primary three colors and contained in said plural pixels, respectively.

9. The in-plane switching type liquid crystal display unit as set forth in claim 8, in which said plural pixel electrodes and said common electrode are formed on said one of said substrate structures together with data lines and thin film transistors selectively connected between said data lines and said pixel electrodes, and said color filters are formed on the other of said substrate structures together with a black matrix.

10. An in-plane switching type liquid crystal display unit comprising
a pair of substrate structures having at least plural pixel electrodes and a common electrode on one of the substrate structures thereof, and

a liquid crystal layer sandwiched between said substrate structures and having a first elastic coefficient concerning a deformation like a bent line and fallen within the range expressed as

$$5 \text{ pico-newton} < \text{said first elastic coefficient} < 20 \text{ pico-newton}.$$

11. The in-plane switching type liquid crystal display unit as set forth in claim 10, in which the liquid crystal of said liquid crystal layer has a positive anisotropy of dielectric constant.

12. The in-plane switching type liquid crystal display unit as set forth in claim 10, in which said liquid crystal further has a second elastic coefficient concerning a deformation like a spray pattern and a third elastic coefficient concerning a twist deformation, and said first elastic coefficient, said second elastic coefficient and said third elastic coefficient satisfy an inequality expressed as

$$0.5 < (\sqrt{K_{11} \times K_{33}} / K_{22}) < 2.0$$

where K_{11} is said second elastic coefficient, K_{33} is said first elastic coefficient and K_{22} is said third elastic coefficient.

13. The in-plane switching type liquid crystal display unit as set forth in claim 10, in which said substrate structures are spaced from each other by a distance ranging from 1.0 micron to 6.0 microns.

14. The in-plane switching type liquid crystal display unit as set forth in claim 10, in which an electric field is created between each of said plural pixel electrodes and a part of said common electrode under application of a potential difference therebetween, and said each of said plural pixel electrodes is spaced from and said part of said common electrode in a direction parallel to inner surfaces of said substrate structures by a distance ranging from 2 microns to 15 microns.

15. The in-plane switching type liquid crystal display unit as set forth in claim 10, in which said substrate structures are spaced from each other by a first distance ranging from 1.0 micron to 6.0 microns, and each of said plural pixel electrodes and an associated part of said common electrode is spaced from each other in a direction parallel to inner surfaces of said substrate structures by a second distance ranging from 2 microns to 15 microns.

16. The in-plane switching type liquid crystal display unit as set forth in claim 10, in which said plural pixel electrodes, parts of said common electrode respectively associated with said plural pixel electrodes and pieces of said liquid crystal layer respectively overlapped with combinations of said plural

pixel electrodes and said parts form in combination plural pixels arranged in a matrix.

17. The in-plane switching type liquid crystal display unit as set forth in claim 16, further comprising color filters selectively put in the primary three colors and contained in said plural pixels, respectively.

18. The in-plane switching type liquid crystal display unit as set forth in claim 17, in which said plural pixel electrodes and said common electrode are formed on said one of said substrate structures together with data lines and thin film transistors selectively connected between said data lines and said pixel electrodes, and said color filters are formed on the other of said substrate structures together with a black matrix.

19. An in-plane switching type liquid crystal display unit comprising
a pair of substrate structures having at least plural pixel electrodes and a common electrode on one of the substrate structures thereof, and

a liquid crystal layer sandwiched between said substrate structures and having a first elastic coefficient concerning a deformation like a spray pattern and a second elastic coefficient concerning a deformation like a bent line, the square root of the product between said first elastic coefficient and said second elastic coefficient being fallen within the range expressed as

$$5 \text{ pico-newton} < \text{SQRT} < 20 \text{ pico-newton}$$

where SQRT is said square root of the product between said first elastic coefficient and said second elastic coefficient.

20. The in-plane switching type liquid crystal display unit as set forth in claim 19, in which the liquid crystal of said liquid crystal layer has a positive anisotropy of dielectric constant.

21. The in-plane switching type liquid crystal display unit as set forth in claim 19, in which said liquid crystal further has a third elastic coefficient concerning a twist deformation, and said first elastic coefficient, said second elastic coefficient and said third elastic coefficient satisfy an inequality expressed as

$$0.5 < (\sqrt{K_{11} \times K_{33}} / K_{22}) < 2.0$$

where K_{11} is said first elastic coefficient, K_{33} is said second elastic coefficient and K_{22} is said third elastic coefficient.

22. The in-plane switching type liquid crystal display unit as set forth in claim 19, in which said substrate structures are spaced from each other by a distance ranging from 1.0 micron to 6.0 microns.

23. The in-plane switching type liquid crystal display unit as set forth in claim 19, in which an electric field is created between each of said plural pixel electrodes and a part of said common electrode under application of a potential difference therebetween, and said each of said plural pixel electrodes is spaced from said part of said common electrode in a direction parallel to inner surfaces of said substrate structures by a distance ranging from 2 microns to 15 microns.

24. The in-plane switching type liquid crystal display unit as set forth in claim 19, in which said substrate structures are spaced from each other by a

first distance ranging from 1.0 micron to 6.0 microns, and each of said plural pixel electrodes and an associated part of said common electrode is spaced from each other in a direction parallel to inner surfaces of said substrate structures by a second distance ranging from 2 microns to 15 microns.

25. The in-plane switching type liquid crystal display unit as set forth in claim 19, in which said plural pixel electrodes, parts of said common electrode respectively associated with said plural pixel electrodes and pieces of said liquid crystal layer respectively overlapped with combinations of said plural pixel electrodes and said parts form in combination plural pixels arranged in a matrix.

26. The in-plane switching type liquid crystal display unit as set forth in claim 25, further comprising color filters selectively put in the primary three colors and contained in said plural pixels, respectively.

27. The in-plane switching type liquid crystal display unit as set forth in claim 26, in which said plural pixel electrodes and said common electrode are formed on one of said substrate structures together with data lines and thin film transistors selectively connected between said data lines and said pixel electrodes, and said color filters are formed on the other of said substrate structures together with a black matrix.